COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS

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THE GEOLOGY OF THE CANBERRA– THARWA AREA

by

G.E.McINNES (student)

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DEPARTMENT OF SUPPLY AND SHIPPING.

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REPORT No. 1949/52
(Geol. Ser. No. 35)

THE GEOLOGY OF THE CANBERRA-THARWA AREA

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CANBERRA, A.C.T. 19th April, 1949.

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I. INTRODUCTION.

This report is a record of field work carried out by B. H. Flinter and G. E. McInnes during January-February 1949. The area covered extends south from Queanbeyan and Mt. Stromlo to 3 miles beyond Williamsdale, and represents an easterly extension of the work carried out by W. J. Orme and H. M. Harris in 1948. Our work has, to some extent, modified the eastern edge of their map. The investigation was essentially of a regional character and little detailed mapping or close examination of sediments or igneous rocks was attempted.

II. FIELD METHODS.

The data collected on field trips was plotted directly onto air photographs where available, or onto Parish and Feature maps on a scale of 20 chains to an inch. The map which accompanies this report was based on the 1 inch Military Survey Sheet of Canberra, extended to the south and west by reference to air photographs, Parish and Feature maps. Owing to the inaccuracy of existing maps, we found triangulation of little use in fixing the position of boundaries. Vehicular transport was used where trafficable roads existed, traverses being made from these roads where necessary.

III. STRATIGRAPHY.

A. Ordovician.

Confirmed and suspected Ordovician sediments occur in three localities, at:

(a) Queanbeyan;
(b) South of Queanbeyan; and
(c) West of the Murrumbidgee River.

At Queanbeyan, one finds interbedded slates, quartzites and yellow micaceous sandstones, which strike approximately north-south and dip steeply to the east. One horizon of grey slates contains abundant graptolites which place these sediments in the middle of the Upper Ordovician.

About four miles south of Queanbeyan on the Cooma Road, there is a belt of silvery grey phyllites, separated from the known Ordovician sediments by a tongue of granite, a bed of limestone and some stringers of sheared porphyry. The sediments are unfossiliferous and strike approximately north-east-south-west, different from that of other Ordovician sediments in the area. They have suffered a higher degree of metamorphism than sediments at Queanbeyan which suggests that they may represent a lower horizon in the Ordovician sequence.

Immediately west of the Murrumbidgee River between the Tidbinbilla Road and the Cotter Junction, there is a north-south belt of sandstones, shales and quartzite. These sediments are lithologically similar to the Tidbinbilla quartzite, from which Upper Ordovician graptolites have been recorded, and have a similar dip and strike, so it is probable that they also belong in the Tidbinbilla Quartzite.

B. Silurian.

To the east of these probable Ordovician sediments is a narrow, discontinuous, north-south belt of shales, limestones and quartzites. The limestone contains Silurian corals. These sediments are separated from the suspected Tidbinbilla Quartzite by a belt of porphyry which appears to have invaded a fault between them. The fault has been observed at Kambah Pool where it separates steeply dipping Silurian limestones from the probable Ordovician sediments.

West of the belt of Ordovician sediments at Queanbeyan there are sandstones and shales in which Silurian fossils have been found. A fault separates the cleaved shales and soft sandstones from the more metamorphosed Ordovician sediments.

Smaller isolated outcrops of less steeply dipping sediments are found as roof pendants on a large body of porphyry which outcrops between the Murrumbidgee River and the Queanbeyan-Cooma Railway line. These resemble the known Silurian sediments near Canberra and so can probably be included in the Silurian.

In some places the Silurian sediments have suffered contact metamorphism, probably from the porphyry, i.e. the sediments on the top and western side of Red Hill give evidence of considerable silicification and limestones containing wollastonite and diopside and hornfelsed shale were collected. In these localities the porphyry does not outcrop but is seen at shallow depth in a quarry on the western side of the hill. In most places, the grade of metamorphism of sediments in contact with the porphyry is not as high as that noted above, and indeed in several places no contact metamorphism was detected.

Another occurrence of limestone on the Cooma Road is separated from the Silurian and Ordovician sediments by granite and sheared porphyry. The limestone has suffered considerable contact and regional metamorphism and cannot be shown to be definitely Silurian or Ordovician. However, because of its extent, it has tentatively been placed in the Silurian.

C. Tertiary.

In the beds of some streams, erosion has revealed thin bands of conglomerate. This conglomerate is distinct from the more recent gravels which are common in the Canberra area and is probably indicative of temporary damming of the streams.

IV. IGNEOUS ROCKS.

A. Granite.

Two occurrences of granitic rock were noted, the Tharwa Granite and a granodiorite near Queanbeyan.

The Tharwa granite occurs extensively on the western edge of the area examined. It is part of a large post-Silurian batholith extending from near the Cotter-Murrumbidgee junction to Cooma. Two rock types were observed in the Tharwa district.

1. A medium-grained gneissic rock containing hornblende.

2. A coarser-grained, more massive rock containing little or no hornblende.

These two phases may be seen in a quarry south-west of Tharwa.

The granodiorite seen south of Queanbeyan crosses the Cooma Road at the bottom of a long hill about 3½ miles from Queanbeyan. The rock appears to have been a more acid type whose chemical composition have been changed to that of a granodiorite by the digestion of limestone. The nearby limestone shows contact metamorphism.

B. Porphyry.

"Porphyry" is the general name used for all the hypabyssal igneous rocks which were found in the area. It is probable that all these rocks can be related to two igneous intrusions although a few roof pendents of tuff may be found.

The porphyry may be divided into two main divisions:

(a) the sheared porphyry.
(b) the massive porphyry.

The sheared porphyry has phenocrysts of idiomorphic quartz and biotite with some plagioclase and orthoclase-all very definitely orienated. The nature of the rock seems to indicate that the shearing at least in some cases, is primary. It is concordant with the strike of the sediments in some places and extends in long fin_er-like masses into them.

The massive porphyry-which is more properly termed a quartz-porphyrite, although in some places orthoclase is a major constituent - appears to have intruded the sheared porphyry. In some places the phenocrysts in the massive porphyry are very abundant making the rock look like a tuff in hand specimen, but microslides show it to be a porphyry.

V. STRUCTURAL OBSERVATIONS.

In crossing the area from west to east, one would cross Ordovician sediments, Silurian sediments, porphyry, then Silurian sediments and Ordovician sediments in that order. This would immediately suggest a syncline which has been intruded with porphyry, but an examination of the dips does not support this theory but rather suggests an anticline. A simple anticline also does not fit the facts, but the finding of two major faults, one on the east and one on the west, both throwing Ordovician against Silurian sediments makes an anticline the more likely solution.

VI. PHYSIOGRAPHY.

The country to the west of the Murrumbidgee River is rough, with considerable relief and in most places heavily timbered. In contrast with this, the plains south of Canberra are undulating and well-grassed, with a few lightly timbered hills. The eastern belt again has more relief and is somewhat rougher than the central plain. The two outside belts converge towards the south.

In our opinion, the topography can be satisfactorily explained by differential erosion, the harder Ordovician sediments in general forming ridges whilst the Silurian sediments and igneous rocks are found in the lower regions.

Erosion may have proceeded as follows:

At the close of Miocene time, there was a large area of plain country above which stood a hump of Ordovician sediments, now the higher western ranges. The land surface established in Miocene time is now represented by the reduced residuals of Black Mountain, Mount Ainslie, etc.

The Pliocene Epoch saw erosion of the now uplifted Miocene land surface and, in the Canberra area, formation of plain country at a persistant level of approximately 1900 feet above the sea.

Subsequent Pleistocene erosion has caused the antecedent river system to become entrenched to the extent of 150-200 feet. Owing to reduced rainfall, the streams are not able to maintain the same rate of erosion as in Pleistocene times and considerable degradation has occurred, leading to the formation of extensive beds of gravel.

19th April, 1949.
CANBERRA, A.C.T.

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Student.

GEOLOGICAL SKETCH MAP

OF THE

CANBERRA - THARWA AREA

SCALE

MILES 1 ¾ ½ ¼ 0 1 MILES

REFERENCE

- Granite
- Porphry
- Aluvium
- Silurian
- Ordovician

155/A'6/

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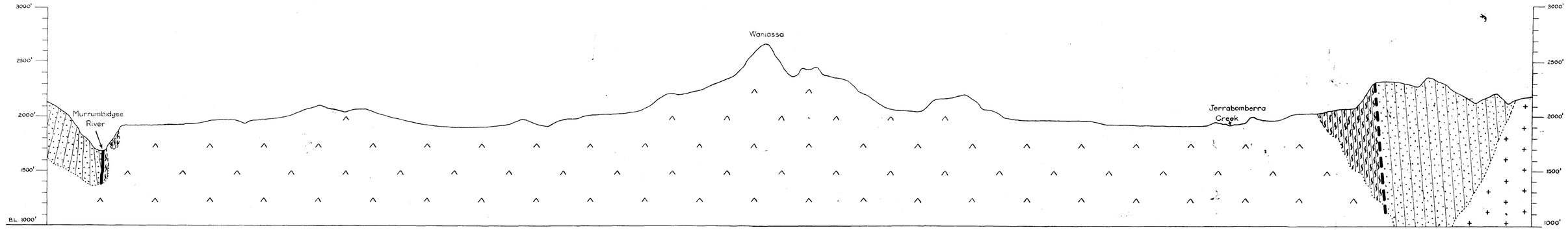

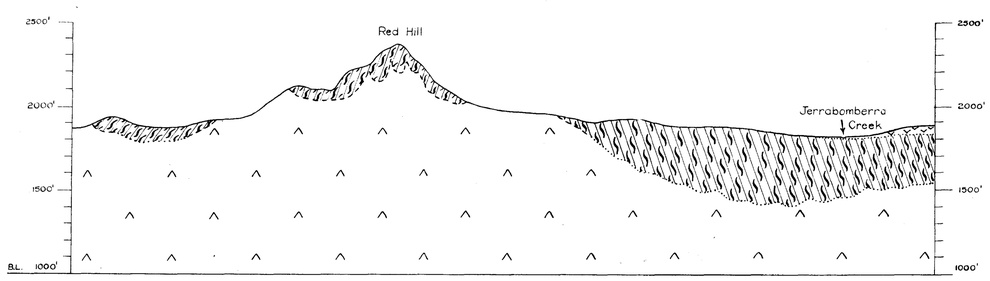

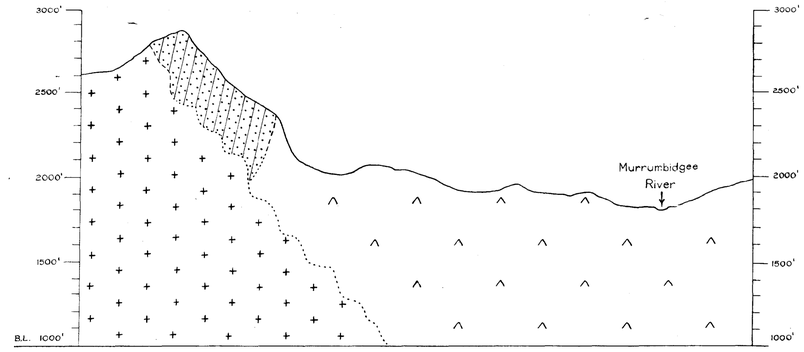

Horizontal Scale

MILES 1 ¾ ½ ¼ 0 1 2 MILES

Vertical Scale

FEET 500 0 500 1000 1500 2000 FEET

GEOLOGICAL SECTIONS

OF THE

CANBERRA - THARWA AREA A.C.T.

REFERENCE

- Granite
- Porphry
- Ordovician Sediments
- Silurian Sediments
- Alluvium

Bureau of Mineral Resources, Geology and Geophysics, March, 1949.

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A.J.S.